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temperance reform will therefore practically begin in the normal schools, to spread thence to all the public schools throughout the various states in which these compulsory laws have been enacted. The receptivity of the young mind is greater than most persons are aware of; and while, at first thought, the instructions of pupils of the age of six years as to the effects of alcohol and tobacco would not seem to promise very great results, still more may be accomplished than would be anticipated. Inasmuch as the end aimed at, if reached, would contribute beyond all calculation to the prosperity and welfare of the human race, the experiment is one which should receive every aid and encouragement possible. It would not be strange if the enforcement of the law demonstrated defects: when these become evident, they can be remedied. If legislators passed no law until it was perfect, the country would be deprived of much useful and needed legislation. D.

NOTES AND NEWS.

COMMISSIONER COLMAN of the agricultural department left for St. Louis on Monday to preside over the conventions of the National sugar association and the Mississippi valley dairymen's association, which are to be held this and next week. At the latter convention the commissioner proposes to show the delegates the progress he is endeavoring to make in the investigations of the adulteration of food, especially of dairy products. Professor Taylor, the microscopist of the department, who claims to have discovered an unfailing test for pure butter as compared with the counterfeit article, will be present, and by means of a magic lantern and a series of micro-photographs will explain the discoveries, and make an address. It is understood that the department is not ready to indorse these discoveries as being absolutely without question; but the commissioner thinks that the convention is entitled to such information as he can furnish, and that the country ought to have the benefit of such suggestions as Professor Taylor has to make.

— A letter from Panama, under date of Jan. 24, states that a government commission, consisting of Professor Rockstrook and Mr. Walker, has been sent from Guatemala to report upon the probability of an outbreak of the Pacaya volcano. The report of these gentlemen announces the total destruction of the village of San Vicente Pacaya. Some forty-four tiled-roof houses completely collapsed, making such a cloud of dust as to create a belief that a new crater had opened. The hot springs surrounding Lake Amatillan emit a larger volume of water, at a higher temperature, than

usual. The crater of Pacaya remains unchanged, while that of Fuego has been very lively.

— The invention of Mr. Edison for sending and receiving messages on a moving train was successfully tested, Feb. 1, on the Staten Island railroad. The operator sat in the middle of the centre car of the train, before a desk furnished with a Morse telegraphic key. He held a telephone at each ear. Under the desk was a battery. From this a ground wire was connected with the car-axle and the rail. Another wire passed through the key and to the roof of the car, which was connected with the roofs of the other cars by short pieces of copper wire. Parallel with the railroad were the telegraph wires of the Baltimore and Ohio company. The induction between the metal roof and the telegraph wires was sufficient to allow of the reception by telephone of Morse signals.

— Professor Fuchs, in his twentieth annual report on the seismological events of 1884, gives 123 shocks of earthquakes, distributed in time as follows: winter, 57 (Dec., 19; Jan., 28; Feb., 10); spring, 24 (March, 13; April, 7; May, 4); summer, 21 (June, 5; July, 9; Aug., 7); autumn, 21 (Sept., 8; Oct., 1; Nov., 12). Those deserving individual mention are, March 24, in upper and central Slavonia, where in Diakovar and other places numerous buildings suffered injury; April 22, in England; May 13, in Crevassa, where a church and other buildings were destroyed; May 19, on the Persian Gulf, in which two hundred persons fell victims by the overthrow of their houses; Aug. 10, in the eastern United States; and the Spanish earthquakes in December. In regard to the last, Dr. Fuchs believes the centrum was not a point, but a line parallel to the Sierras Tejeda and Almirajara; nor does he think they were of greater importance than those of Belluno in 1873, of Agram in 1880, and of Chios in 1881. There was very little volcanic activity throughout the year, and that only in Aetna, Vesuvius, and St. Augustin, in Alaska.

— Mr. R. L. Harris has lately read a paper on two Daft electric motors, used on the Baltimore street-railways, before the American society of civil engineers: he reports both of these motors as being very successful in all weathers and conditions of the track. The grades are very steep for motors, reaching three hundred and thirty feet per mile in some places; nevertheless these motors have at no time failed to pull overloaded cars with perfect ease. These motors do the work of fifteen horses each, at an average daily running expense of \$4.62 for fuel and attendance.

— The recent experiments of the Franklin institute, upon incandescent and arc lights, give the

following averages: one pound of anthracite burned under a good boiler yields, in the incandescent system of lighting, about 40 candles; the same weight of coal gives from the naked arc-light about 158 candles; ordinarily arc-lights are shaded so as to lose about one-half their intensity, so that only 80 candles per pound of coal are available; one pound of bituminous coal will yield from five to six cubic feet of illuminating-gas; this gas will, in the standard argand burner, yield from 14 to 17 candles. Illuminating-gas is burned at once in the simplest manner, and the amount of machinery and care required by electric lighting offsets its greater economy of fuel, light for light. There is little room for improvement in dynamos, but the most important economies will arise from more skilful use and design of the steam-engines required to drive the dynamos. The steam-engine, although much the senior of the dynamo in the list of inventions, is not nearly so well understood. It is but very recently that the laws of condensation and expansion of steam in the engine actually at work have been grasped, and our limitations so clearly defined as to point out the logical way to greater economies, and prevent us from attempting economy under impossible conditions.

—The photograph of the normal solar spectrum, made by Prof. H. A. Rowland at the Johns Hopkins university, Baltimore, is now complete from wave-length 3680 to 5790; and the portion above 3680 to the extremity of the ultra-violet, wave-length about 3100, is nearly ready. Negatives have also been prepared down to and including *B*, and it is possible they may be prepared for publication. The plates, seven in number, all contain two strips of the spectrum, except No. 2, which contains three. They are three feet long and one foot wide. These can now all be furnished to order except No. 2, the negative of which is being made. The plates will be delivered in Baltimore or New York, or will be sent by express or mail, securely packed, at the charge and risk of the purchaser, at the following net prices: the set of seven plates, unmounted, \$10; mounted on cloth, \$12; single plates, \$2 each; mounted on cloth, \$2.25.

—A telegram from Guayaquil, of Jan. 20, announces that indications of an earthquake were observed in Chimbo contemporary with a renewed outbreak of the Cotopaxi volcano.

—There are good reasons for supposing that a bill will pass both houses of congress, appropriating fifteen thousand dollars annually to Cornell university for the establishment of an agricultural experiment-station at that institution.

—The Norwegian ship *Ferdinand* at Philadelphia reports that near midnight of Jan. 8, in latitude $38^{\circ} 20'$ north, longitude $71^{\circ} 20'$ west, during a severe storm of rain and wind, the night being very dark, all the yard-arms and mastheads were suddenly lighted up with St. Elmo's fire, having the appearance of bright lanterns. The phenomenon lasted about three minutes.

—The opening of the third electrical exhibition at St. Petersburg, which took place on Jan. 1, is attracting much attention among the people, especially that portion devoted to the telephone. The exhibition is said to be noteworthy for the novelty, variety, and number of its objects. For illumination, all the known systems of electrical lighting are employed.

—The *Kölnische zeitung* for Jan. 14 states that at the preceding meeting of the Vienna geographical society was announced the discovery, by Dr. Stapf, of a hitherto unknown lake in the Persian desert. The lake, according to Dr. Stapf, is at least forty kilometres long, and is probably of recent origin. According to information obtained from Mohammedan sources, it appears that the lake dried up after a previous existence, and later re-appeared. The water is to a very considerable degree alkaline.

LETTERS TO THE EDITOR.

, Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The competition of convict labor.

THE two articles which have appeared in *Science* on this problem (vii. Nos. 153 and 155) by Mr. N. M. Butler treat this subject after the manner of that system or school of political economy which is taught in the colleges, and which rules in business. Its aim and end is profit. It is science 'for revenue only,' and it ignores morality or humanity. It judges all human activity by the standard of profitableness. In reference to this particular question, Mr. Butler formulates that stand-point very characteristically by the following initiatory axiomatic phrase: "That convicts should be employed, if possible, in a manner profitable to the state, is a proposition that no sane man controverts."

To be sure, any thing humane is sentimental nonsense to this school; and any thing so 'unbusinesslike' as the greatest of virtues, charity, is insanity. But this form of 'insanity' is increasing rapidly in the world, and developing a new school of political economy, whose central principle is to further the welfare of all men. From the stand-point of that school, a prison should not be a slave-pen for grinding out 'profit' to the state, but either a refuge for moral cripples or a school for those who lack the moral training necessary to make them good citizens.

About the cause of the agitation of this question among workingmen, Mr. Butler makes some state-